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from the disease when they were half grown; the rest were quite well developed, but at the last part of the experiment began to be affected. Several heads were large, the largest being over the greatest number of wires and nearest the electrodes. Examination of the roots disclosed the same phenomena as in A.

Near plot B were also set twenty other plants, subjected to like conditions as the first, but without electricity; all but one died from mildew before they were half grown, the solitary plant that survived being only partly developed at the close of the experiment, and even this was badly affected with the disease.

Everything considered, the results were in favor of electricity. Those plants subjected to the greatest electrical influence were hardier, healthier, larger, had a better color and were much less affected by mildew than the others. Experiments were made with various grasses, but no marked results were obtained.

The question would naturally arise whether there may not be a limit reached where electricity would completely overcome the attack of mildew and stimulate the plant to a healthy and vigorous condition throughout its entire growth. From the fact that the hardiest, healthiest, and largest heads of lettuce grew over the greatest number of currents and nearest the electrodes, it would seem that electricity is one of the agents employed by nature to aid in supplying the plant with nourishment and to stimulate its growth. To what extent plants may be submitted to electrical influence, or what strength of current is best suited to them and what currents prove detrimental to their development, have not been determined as yet, but it is desirable to continue this research until some definite information shall be gained on these points. Probably different varieties of plants differ greatly in their capacity for enduring the action of electric currents without injury — experiment alone must determine this.

It has been proved that the slow discharge of static electricity facilitates the assimilation of nitrogen by plants. Faraday showed that plants grown in metallic cages, around which circulated electric currents, contained fifty per cent less organic matter than plants grown in the open air. It would seem from the researches of the latter physicist, that those plants requiring a large percentage of nitrogen for their development would be remarkably benefited if grown under electric influence.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

The First Locomotive Run in America.

It was in 1829, the same year in which Stephenson, with his "Rocket," demonstrated the practicability of rapid steam traction on railways. The engine was named the Stonebridge Lion. It was made in England and imported by the Delaware and Hudson Canal Company, and designed to draw coal from their mines in Carbondale to the head of their canal in Honesdale, Penn. On its arrival, it was placed on the railway and run from Honesdale to Seeleyville, a little over a mile. It was found to be too tall to go under a highway bridge over the track at that place, and was reversed and run back to Honesdale. All parts of the railway above the surface of the ground were built on trestles, and the heavy engine racked them so much as to endanger safety. For these reasons the locomotive was set off by the side of the track, and a board shed built over it. The railway was planked, and horses employed to draw the cars. The engine stood there safe for several years.

The writer was personally acquainted with these facts. Two men who rode on that trip are living at this time.

In 1840 and 1841, while I was a student in the Honesdale Academy, I found the boards on one side of the shed torn off and the engine exposed to view. I spent many hours in trying to study out its mechanism and movement. No published description of a steam engine was then within my reach. The Stonebridge Lion had four wheels, three or three and a half feet in diameter, and

the boiler rested directly on the axles. The cylinders were vertical, one on each side of the boiler near the hind wheels. There were two heavy iron walking-beams a few feet above the boiler, and to one end of each a piston-rod was attached by Watt's parallelogram. The other ends of the beams were joined by swinging-rods to cranks at right angles to each other on the forward wheels. There was no whistle or bell, I think. The engineer stood on a small open platform behind the boiler.

Soon after 1841 the engine began to be carried off piece by piece, mostly by blacksmiths and machinists; and I am told that only one small piece of the iron is now in existence in its primitive form. If the engine had been kept intact, it would be worth almost its weight in silver for exhibition in Chicago in 1893.

M. H.

The Historical American Exhibition at Madrid.¹

ONE of the most interesting and instructive celebrations proposed for the year 1892 is the Spanish celebration, the chief feature of which will be an exhibition at Madrid, termed the Historical American Exhibition, the special object of which is to illustrate primitive American life and the history of the period of discovery and conquest. In selecting the prehistoric and early historic eras for illustration, the Spaniards will make their own exhibition complete in itself, without in the least competing with the Chicago exhibition.

The plan of the exhibition is, within its limits, a very broad one, comprising five general divisions, viz., prehistoric America, the historic period, Indian industrial arts, cartography, nautical instruments, etc., and the fine arts and kindred subjects. Under the head of prehistoric America, plans, models, reproductions, drawings, etc., are solicited of ancient caves and caverns, and anything that may help to show the use of these primitive places as human dwellings. Similar models, drawings, or photographs are desired of American menhirs, dolmens, and mounds, as well as lacustrine dwellings. All sorts of implements and objects relating to this period are desired, such as stone weapons, articles of bone and horn, pottery, ornaments, utensils of bone, wood, stone, and other materials, with fossil or animal bones throwing light on the archæology of this time. Examples of all the ages and periods of primitive life as they can be traced on the American continent are wanted.

In the historic period the objects desired include models of ancient American buildings, architectural remains, plans, models, and drawings of restored monuments. Examples of sculpture, bas-reliefs, architectural paintings, and other forms of painted decoration form another class. Under industrial art is included clothing and adornment of the aborigines and uncivilized Indians, with implements of war, offensive and defensive. Jewels of gold, silver, bone and ivory, pottery, household utensils, and articles used in transportation by water and land, constitute another division of this branch, while written documents in native tongues, pictures, and photographs of Indians and effigies showing native costumes, models of Indian dwellings, and Indian crania, form a third division.

The department of cartography includes maps, plans, charts, and drawings, and all that concerns ancient cartography, with models of vessels anterior to the voyage of Columbus, as well as those he himself used. A section is devoted to nautical instruments, with the idea of illustrating the instruments, charts, and maps in use at the period of discovery, while objects in personal use by Columbus and pictures of the same are also desired. The fine arts department includes ancient architectural monuments, sculpture, paintings, industrial and artistic work following the discovery, American coins, literary and scientific publications, manuscripts, charts, and plans of all kinds, from the discovery to the middle of the eighteenth century.

Most liberal inducements are offered to intending exhibitors from America. The exhibition will be held in the new library and national museum building in the park at Madrid, which will be used for the first time for this purpose, the exhibition serving as a sort of inauguration of the structure, which has been a num-

¹ This letter appeared also in The Nation.